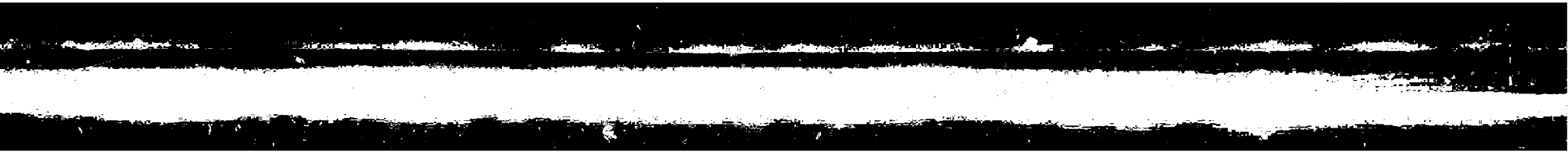
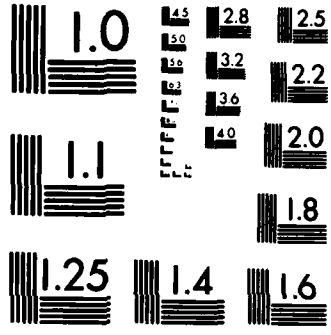
AD-A148 700 FLAD USER'S MANUAL: FLAD FILE CONTENTS(U) NAVAL RESEARCH LAB WASHINGTON DC G P MUELLER 12 DEC 84 NRL-MR-5470 1/1

UNCLASSIFIED F/G 9/2 NL

END





(2)

NRL Memorandum Report 5470

FLAD User's Manual: FLAD File Contents

G. P. MUELLER

Radiation-Matter Interactions Branch
Condensed Matter and Radiation Sciences Division

December 12, 1984

NAVAL RESEARCH LABORATORY
Washington, D.C.

AD-A148700

SECUR CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

1a REPORT SECURITY CLASSIFICATION UNCLASSIFIED	1b. RESTRICTIVE MARKINGS
2a SECURITY CLASSIFICATION AUTHORITY	3 DISTRIBUTION / AVAILABILITY OF REPORT Approved for public release; distribution unlimited.
2b DECLASSIFICATION / DOWNGRADING SCHEDULE	
4 PERFORMING ORGANIZATION REPORT NUMBER(S) NRL Memorandum Report 5470	5. MONITORING ORGANIZATION REPORT NUMBER(S)
6a. NAME OF PERFORMING ORGANIZATION Naval Research Laboratory 6b OFFICE SYMBOL (If applicable) Code 6650	7a. NAME OF MONITORING ORGANIZATION
6c. ADDRESS (City, State, and ZIP Code) Washington, DC 20375-5000	7b. ADDRESS (City, State, and ZIP Code)
8a. NAME OF FUNDING / SPONSORING ORGANIZATION 8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
8c. ADDRESS (City, State, and ZIP Code)	10. SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT NO. 62761N; PROJECT NO.; TASK NO.; WORK UNIT ACCESSION NO. DN780-081

11 TITLE (Include Security Classification)
FLAD User's Manual: FLAD File Contents

12. PERSONAL AUTHOR(S)
Mueller, G.P.

13a. TYPE OF REPORT	13b. TIME COVERED	14. DATE OF REPORT (Year, Month, Day)	15. PAGE COUNT
Interim	FROM _____ TO _____	1984 December 12	13

16 SUPPLEMENTARY NOTATION

17 COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	Laser simulation FLAD CLAD

19 ABSTRACT (Continue on reverse if necessary and identify by block number)

The Johns Hopkins University laser irradiation simulation code CLAD was converted to FORTRAN for use at NRL some years ago. The contractor, who renamed the code FLAD, left a series of tape files containing the new code. This report documents the location and contents of these files.

20 DISTRIBUTION / AVAILABILITY OF ABSTRACT ☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT ☐ DTIC USERS	21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED
22a NAME OF RESPONSIBLE INDIVIDUAL G. P. Mueller	22b. TELEPHONE (Include Area Code) (202) 767-2972 22c. OFFICE SYMBOL Code 6650

DD FORM 1473, 84 MAR 83 APR edition may be used until exhausted.
All other editions are obsolete.

SECURITY CLASSIFICATION OF THIS PAGE

FLAD USER'S MANUAL: FLAD FILE CONTENTS

The computer code FLAD is designed to compute the effects of laser irradiations on the surfaces of materials. FLAD is a direct translation of the code CLAD, which was written and documented (Ne74) by R. W. Newman of The Johns Hopkins Applied Physics Laboratory. To indicate the applications of the code, the following is the abstract from Newman's report:

> A Continuous Wave Laser Damage computer program (CLAD) has been developed to compute damage caused by a high power laser beam impinging on material surfaces. The program includes three-dimensional conduction, temperature dependent thermal properties, radiation relief, aerodynamic heating, laser radiation heating, heats of fusion and vaporization, chemical ablation, and material removal for flat and cylindrical bodies. The program uses finite difference techniques to compute mass loss and temperature histories of laser irradiated metals, ceramics, and ablatives. This report discribes the computational methods contained in CLAD, along with some of the assumptions and limitations contained therein. The report is written as a user's manual and contains a description of the main program required to perform a CLAD analysis. Also included is a sample problem, the corresponding main program, and printed output, which will familiarize the user with an actual application of CLAD.

CLAD was written in the language PL/1. Under contract to NRL, SAI (Science Applications, Incorporated) (Sc--) converted the code to FORTRAN IV and made the modifications necessary for it to run on the TI ASC computer at NRL. Certain enhancements to the code were added by SAI; these enhancements are described in their report.

In addition to the reports just cited, portions of the FLAD files on the ASC also describe the use or workings of the code. These portions are indicated in Appendix B.

While the conversion and testing seems to have been completed, no one seems to have used the converted code; nor, as of this date, does anyone in the laboratory seem familiar with its use. All that exists of the code, besides the two reports cited above, is a set of 23 files that are stored on tape in the ASC's catalog system.

In the process of determining the applicablity of the code, it was necessary to review to contents of these 23 files. It seems worthwhile to

Manuscript approved August 30, 1984.

document the contents of the FLAD files so that other lab personnel will not have to go through the same process before they use it.

In Appendix A I document the location in the catalog system of the 23 FLAD files, along with a brief description of the contents of each file. In Appendix B I catalog the contents of all the files; each subroutine, data set, output file, and so forth is listed with an indication of which of the FLAD files that it appears in.

SAI created a procedure for using FLAD that I find awkward--it involves compiling a program named SIZER and linking it to the various FLAD subroutines for each use of the code. It seems simpler to me to rework this system so that all of the recompiling is not necessary.

I also recommend that any new user compile all of the subroutines for himself, rather than use the object modules that are stored in the FLAD files. In that way, he will be confident as to what version of each routine has been linked into the final object code.

REFERENCES

(Ne74) R. W. Newman, "A User's Guide for the Continuous Wave Laser Damage Computer Program," (The Johns Hopkins University, Applied Physics Laboratory, Silver Spring, Maryland), Report No. TG 1268.

(Sc--) "FLAD User's Manual," (Science Applications, Incorporated, Arlington, Virginia), Report No. 164-416-063.

APPENDIX A: FLAD FILES ON THE ASC CATALOG SYSTEM

The FLAD files created or converted by Bjork are stored in the NRL TI ASC catalog. They are on tape and can all be reached using the pathname

ROOT=USERCAT/D64/B10/BJORC1

There are 23 files in the catalog, which I have named "A" through "W". Table A2 lists these 23 files by label, along with the appropiate pathname, version number and file organization. The nature of the contents of each file is indicated in the contents column. The DS files are all libraries. The symbols that are used in Table A2 are listed in Table A1.

TABLE A1

SYMBOLS USED IN TABLE A2

SYMBOL	DESCRIPTION
F	FORTRAN file.
o	Object file.
j	JSL file.
d	Data file.
P	Output file, sometimes with an attendent input file.
#	Descriptive file for the FLASTIC system, which is derived from CLAD.
¢	Descriptive file for one of the CLAD subroutines. The first four letters in the name of one of these "¢" files are a condensed version of the name of the subroutine it describes.

TABLE A2

FLAD FILES ON THE NRL ASC CATALOG

LABEL	NODE	VERS	ORG	CONTENTS	COMMENTS
A	/BJLIB	0	DS	F,d,#,¢	Miscellaneous Files
B	/BJSAFE	0	DS	F,d,#,¢	Miscellaneous Files
C	/CLDATA	0	DS	d	Principal Data Sets
D	/CLDATA	1	DS	d	Copy, more or less, of D
E	/CLDJSL	0	DS	j	DO NOT USE
F	/CLDJSL	1	DS	j	DO NOT USE
G	/CLIB	0	DS	F	Principal FORTRAN file
H	/CLIB	1	DS	F	Copy, more or less, of G
I	/CLMAIN	0	PS	o	DO NOT USE
J	/CLOBJ	0	DS	o	DO NOT USE
K	/CLOBJ	1	DS	o	DO NOT USE
L	/CLOBJHE	0	DS	o	DO NOT USE
M	/CLOBJHE	1	DS	o	DO NOT USE
N	/FEMLIB	0	DS	F	Program SIZER
O	/MAINSR	0	PS	F	Program SIZER
P	/MAINSR	1	PS	F	Program SIZER
Q	/MELTERS	0	DS	F	Subroutine QFUSION
R	/NEWBJSAF	0	DS	d,j	Miscellaneous Files
S	/PLTFILES	0	DS	P	Three Output Files
T	/PRTFILES	0	DS	P	Three Output Files
U	/SPAWN	0	DS	o	DO NOT USE
V	/TC1AD1OP	0	PS	P	Output File
W	/TC1AD1OT	0	PS	P	Output File

APPENDIX B: CONTENTS OF THE FLAD FILES ON THE ASC CATALOG

Table B2 lists every element (subroutine, data set, object module, etc) that appears in the FLAD files, with an indication of which of the 23 FLAD files the element appears in. For the purposes of this table, the 23 files are broken down into four groups: FORTRAN files, data and job specification files, output files, and object and link editor files.

Table B1 lists all of the symbols that are used to describe the elements in Table B2.

TABLE B1

SYMBOLS USED IN TABLE B2

SYMBOL	DESCRIPTION
F	A FORTRAN routine.
*	All of the FORTRAN routines that seem to be part of the basic FLAD package (that is, that are linked toegether with SIZER) are indicated by an asterisk before their names in Table B2.
#	A partial description of the "FLASTIC" package, which is "CLAD" with the NRL modifications.
1	A data set of type 1: Program Size
2	A data set of type 2: Program Control and Target Geometries
3	A data set of type 3: Material Property
4	A data set of type 4: Time Dependent Auxillary Heating
5	A data set of type 5: Beam Description
¢	A description of one of the CLAD subroutines. The first four letters of this subroutine's name is a condensation of the name of the subroutine it describes.

TABLE B1 (Continued)

SYMBOLS USED IN TABLE B2

SYMBOL	DESCRIPTION
b	PIGTST is a non-FORTRAN program (perhaps PL/1). It appears in library "A" as an addition to subroutine "SIZER." The text of this program language starts in column 5, so CIFER treated it as a long continuation of "SIZER,"
i	A number of programs are called "MAIN" in these files because CIFER names any program that lacks a SUBROUTINE, PROGRAM or FUNCTION statement "MAIN". "B00083" and "SETUP" are two of these, and they are listed both under their own names and "MAIN". "SIZER" is probably another. There is no easy way to tell what an object program named "MAIN" actually is.
j	JSL file.
P	Output file--sometimes the corresponding input data is included.

TABLE B2

LOCATION OF VARIOUS FLAD ELEMENTS

	FORTRAN								DATA & JSL					OUTPUT				OMODS & LMODS					
FILE	A	B	G	H	N	O	P	Q	C	D	R	E	F	S	T	V	W	I	J	K	L	M	U
*ABTST1	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	o	o	.	.	.
AGGAS2	.	.	.	.	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.
AL2024	.	3	.	.	.	.	.	.	3	3	3	.	.	.	.	.	.	.	.	.	.	.	.
AL2024T1	.	.	.	.	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.
B00083[i]	.	F	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
*BEAM	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	o	o	.	.	.
*CAPCN3	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	o	o	o	o	.
CAT06	.	.	.	.	.	.	.	.	.	.	.	j	j	.	.	.	.	.	.	.	.	.	.
CAT12	.	.	.	.	.	.	.	.	.	.	.	j	j	.	.	.	.	.	.	.	.	.	.
CIFEX	.	j	.	.	.	.	.	.	.	.	j	.	.	.	.	.	.	.	.	.	.	.	.
*COMCON	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	o	o	o	o	.
*CON	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	o	o	o	o	.
CONDUC	.	F	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
CONVEC	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
CONVRT	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
DATA	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
DATARK	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
DATASZ	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
DATATM	4	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
DIMEN	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	o
DOCTOR	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
DONVRT	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
DUMP	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ERASE	.	.	.	.	.	.	.	.	.	.	.	j	j	.	.	.	.	.	.	.	.	.	.
FACTR%A	.	F	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FINALX	#	#	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
*FIXUP	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	o	o	.	.	.
FLDXJSL	.	.	.	.	.	.	.	.	.	.	.	j	j	.	.	.	.	.	.	.	.	.	.
FLUXN	.	F	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

TABLE B2 (Continued)

LOCATION OF VARIOUS FLAD ELEMENTS

	FORTRAN								DATA & JSL					OUTPUT				OMODS & LMODS					
FILE	A	B	G	H	N	O	P	Q	C	D	R	E	F	S	T	V	W	I	J	K	L	M	U
FORT	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FRESNI	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
G4156E	5	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
GRDRO1	.	5	.	.	.	.	.	.	5	5	.	.	.	.	.	.	.	.	.	.	.	.	.
GRDRO2	.	5	.	.	.	.	.	.	5	5	.	.	.	.	.	.	.	.	.	.	.	.	.
GRDTST	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
*GRDZAP	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	o	o	.	.	.
HETGEN	.	F	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
HEVOL	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	o	o	o	o	.
*HISTRY	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	o	o	o	o	.
LOADDATA	.	.	.	.	.	.	.	.	.	.	.	j	j	.	.	.	.	.	.	.	.	.	.
LOADJSL	.	.	.	.	.	.	.	.	.	.	.	j	j	.	.	.	.	.	.	.	.	.	.
MAIN	.	F	F	F	F	.	.	.	.	.	.	.	.	.	.	.	.	o	o	o	o	.	o
B00083[i]	.	F	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
SETUP[i]	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
MAINGEN	.	.	.	.	.	.	.	.	.	.	.	j	j	.	.	.	.	.	.	.	.	.	.
*MAINL	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	o	o	o	o	.
MATMLT	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
NOZAP	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
PARA1	#	#	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
PARA2	#	#	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
PARA3	#	#	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
PARA4	#	#	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
PARA5	#	#	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
PARA6	#	#	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
PIGTST	b	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
*PLOTIT	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	o	o	o	o	.
*POLATE	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	o	o	o	o	.
POURIT	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	o	o	.	.	.
*QDUMP	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	o	o	o	o	.
*QFUSON	.	.	F	F	.	.	.	F	.	.	.	.	.	.	.	.	.	.	o	o	o	o	.

TABLE B2 (Continued)

LOCATION OF VARIOUS FLAD ELEMENTS

	FORTRAN								DATA & JSL					OUTPUT				OMODS & LMODS					
FILE	A	B	G	H	N	O	P	Q	C	D	R	E	F	S	T	V	W	I	J	K	L	M	U
QFUSTX	¢	¢	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
RADIAN	.	.	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
RANDRV	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
RANDU	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
RANSEQ	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
RDRKTX	¢	¢	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
RDTMTX	¢	¢	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
*READRK	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	o	o	o	o	.
*READTM	.	4	F	F	.	.	.	.	4	4	.	.	.	.	.	.	.	.	o	o	o	o	.
RECMPFXI	.	.	.	.	.	.	.	.	.	.	.	j	j	.	.	.	.	.	.	.	.	.	.
RECMPNXL	.	.	.	.	.	.	.	.	.	.	.	j	j	.	.	.	.	.	.	.	.	.	.
RSLMC	.	F	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
S304K038	.	.	.	.	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.
S304R038	.	.	.	.	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.
*SET	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	o	o	o	o	.
SETUP[i]	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
SETTX	¢	¢	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
SHOOT	.	.	.	.	.	.	.	.	.	.	.	j	j	.	.	.	.	.	.	.	.	.	.
*SIZER	1	1	.	.	.	F	F	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.
SPACER	.	.	.	.	.	.	.	.	.	.	.	h	h	.	.	.	.	.	.	.	.	.	.
SPECIF	.	F	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
*STEP	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	o	o	o	o	.
STEPTX	¢	¢	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
STL304	.	3	.	.	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.
STLCR	.	3	.	.	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.
*SURFER	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	o	o	.	.	.
TARG	F	2	.	.	.	.	.	.	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.
TC1AD100	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	.	.	.	.	.	.	.	.
TC2AE100	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	.	.	.	.	.	.	.	.
TC3AE100	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	.	.	.	.	.	.	.	.
THRDTX	¢	¢	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

TABLE B2 (Continued)

LOCATION OF VARIOUS FLAD ELEMENTS

	FORTRAN								DATA & JSL					OUTPUT				CMODS & LMODS					
FILE	A	B	G	H	N	O	P	Q	C	D	R	E	F	S	T	V	W	I	J	K	L	M	U
*THREED	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	o	o	o	o	.
THREEH	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
UCC	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
UNA	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
USERPX	#	#	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
WALL	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
*WRITER	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	o	o	o	o	.
*ZAPNOD	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	o	o	.	.	.
ZAPNTX	¢	¢	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
output	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	P	P	.	.	.	.	.	.

END

FILMED

1-85

DTIC